Section II (Remarks)

A. Summary of Amendment to the Claims

By the present Amendment, claims 37, 64, 65, 67, 68, 70 and 71 have been amended and claims 63 and 66 have been cancelled, without prejudice. Claims 1-36 were previously cancelled. No new matter within the meaning of 35 U.S.C. §132(a) has been introduced by the foregoing amendments.

The amendments made herein are fully consistent with and supported by the originally-filed disclosure of this application. Specifically, claims 37, 68, 70 and 71 have all been amended to include recitation of the characteristic "wherein the liner layer comprises an organic polymer and/or an inorganic polymer." Such amendment of the claims is supported by now cancelled claims 63 and 66 and in the specification of the published PCT application on page 17, paragraph [0051]. Claims 37, 68, 70 and 71 have further been amended to correct punctuation of those claims. The amendments to the punctuation do not affect the substance of the claims.

Thus, upon entry of the amendments, claims 37-62, 64, 65, 67-72 will be pending and under examination.

B. Rejection under 35 U.S.C. §102

In the Office Action mailed September 24, 2009, the examiner rejected claims 37-40, 43, 44, 51-54, 60-61, and 69 under 35 U.S.C. §102(b) in view of U.S. Patent No. 4,595,485 (hereinafter "Takahashi et al.").

Initially, it is noted that none of independent claims 68, 70 or 71 are listed as rejected under 35 U.S.C. §102(b) in the heading on page 2 of the Office Action mailed September 25, 2009. However, the discussion under the heading indicating rejection of claims 37-40, 43, 44, 51-54, 60-61, and 69 begins "[w]ith respect to Claims 37, 68, 70 and 71…" Claims 68, 70 and 71 are discussed below as if rejected under 35 U.S.C. §102(b).

In support of the rejection of independent claims 37, 68, 70 and 71 as anticipated by Takahashi et al., the examiner cited col. 9, ll. 26-36 of Takahashi et al. It is the examiner's position that the insulating layer of Takahashi et al. anticipates the "liner layer" of applicants' claimed invention. Applicants respectfully disagree.

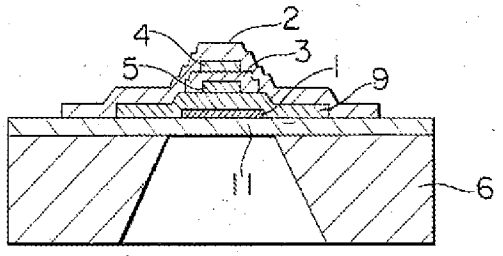
By the present Response, claims 37, 68, 70 and 71 have all been amended to include recitation of the element "wherein the liner layer comprises an organic polymer and/or an inorganic polymer." Takahashi

et al. do not describe a sensor, method or system containing a liner layer comprising an organic and/or inorganic polymer, as set forth in claims 37, 68, 70 or 71.

Takahashi et al. generally relates to "limiting electric current type oxygen concentration sensor[s]" which are used to measure the oxygen concentration in a gas (col.1, lines 10 to 15). The basic principle of this type of sensor is summarily described at col. 1, lines 18 to 31. The sensor of Takahashi et al. includes sequentially stacked: a first electrode, a thin solid electrolyte thin film and a second electrode on a substrate, where the first and second electrodes are both gas-permeable (col. 2, lines 17-21).

Fig. 11 illustrates the embodiment described at col. 9, lines 26-36, and cited by the examiner: "a sectional view showing a limiting electric current type oxygen sensor according to a fourth embodiment of the present invention …[where a] thin SiO_2 insulating film 11, a heater 1, an Al_2O_3 or SiO_2 insulating film 9, cathode 5, thin solid electrolyte film 3, anode 4, and coating 2 are sequentially formed on one major surface of an Si substrate 6."

FIG. 11



However, as acknowledged by the Examiner, Takahashi et al. do not disclose a liner layer comprising a polymer (Office Action mailed September 25, 2009, p. 4).

Independent sensor claim 37 therefore is not anticipated by Takahashi et al. Similarly, claim 68 recites a method of producing a sensor, where the sensor comprises a liner layer that comprises "an organic polymer and/or an inorganic polymer." As Takahashi et al. do not disclose a liner layer comprising a polymer, Takahashi et al. do not anticipate independent claim 68.

Claim 70 recites a system for measuring the gas permeability of a test material, comprising use of a sensor comprising a liner layer "wherein the liner layer comprises an organic polymer and/or an inorganic polymer." As Takahashi et al. do not disclose a liner layer comprising a polymer, Takahashi et al. do not anticipate independent claim 70. Claim 71 recites a method of determining the gas permeability of a test material, comprising use of a sensor comprising a liner layer "wherein the liner

layer comprises an organic polymer and/or an inorganic polymer." As Takahashi et al. do not disclose a liner layer comprising a polymer, Takahashi et al. do not anticipate independent claim 71.

Additionally, system claim 70 and method claim 71 both recite a sensing element "wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element…" As recited, in the system and method of claims 70 and 71, the electrical conductivity of the sensing element is changing due to the reaction of the material used for the sensing element with water and/or oxygen. For example, a sensing element made of water and/or oxygen sensitive material, such as magnesium or calcium (see claim 40) reacts with oxygen from air to form magnesium oxide or calcium oxide when air is passing through the sensing element. This transformation of the sensing element results in a different electrical conductivity and thus allows determination of the permeation rate of the sensing material tested (see also specification page 3-4, paragraph [0014]).

By contrast, the limiting electric current type oxygen sensors described by Takahashi et al. seek to measure the oxygen concentration in a gas, such as exhaust of a combustion engine. In the sensors of Takahashi et al., oxygen is actively transported through an oxygen ionic conductive solid electrolyte by applying a current to this electrolyte using electrodes located at both sides of the electrolyte. The oxygen is converted into oxygen ions (see col.7, lines 10 to 20) at the cathode before passing through the thin solid electrolyte film 3. The amount of oxygen determines the electrical current flowing between the electrodes and through the electrolyte. The amount of oxygen can be calculated in accordance with the change in the electrical current.

In short, the limiting electric current type oxygen sensors of Takahashi et al. seek to measure the oxygen concentration in a gas, while the sensors claimed in the captioned application seek to measure gas permeation properties of materials (see specification, page 2, lines 1 to 3 and page 3, paragraph [0013]). Takahashi et al. do not anticipate claims 70 or 71.

Claims 38-40, 43, 44, 51-54, 60-61, and 69 depend directly or indirectly from claims 37, 68, 70 or 71 and are therefore patentable for the same reasons advanced above in support of the patentability of independent claims 37, 68, 70 and 71.

In rejecting dependent claim 40, the examiner alleges that "Takahashi et al. teach of the metal for the metal oxide being magnesium or calcium…" Applicants respectfully submit that the examiner has misunderstood the dependency of claim 40. Claim 39 recites a material selected from, among other

options, a metal and a metal oxide. Claim 40 further defines the metal, not the metal oxide. Claim 42, which is not rejected under 35 U.S.C. §102, further defines the metal oxide of claim 39. A basic measuring principle of the present invention relies on the transformation of metals, such as calcium and magnesium, into metal oxides. Therefore, claim 40 does not refer to a base metal of a metal oxide and is not anticipated by magnesium oxide or calcium oxide in claims 2 and 4 of Takahashi et al.

Accordingly, withdrawal of the rejection of claims 37-40, 43, 44, 51-54, 60-61, and 69 under 35 U.S.C. §102(b) as being anticipated by Takahashi et al. is respectfully requested.

C. Rejection under 35 U.S.C. §103

In the Office Action mailed September 24, 2009, the examiner rejected claims 41, 42, 46-50, 55-59, and 62-68 under 35 U.S.C. §103(a) in view of Takahashi et al. Applicants respectfully disagree.

As with the rejection under 35 U.S.C. §102, the identity of the claims actually rejected is unclear. The heading "1." on page 4 of the Office Action mailed September 25, 2009 states that "[c]laims 41, 42, 46, 50, 55-59, 62-68 are rejected under 35 U.S.C. §103…" However, the detailed rejections following the heading address each of claims 41, 42, 45, 46, 50, 55-59, 62-67 and 72. From the text of the Office Action mailed September 25, 2009 it is unclear whether claims 45, 68 and/or 72 are rejected under 35 U.S.C. §103. All of claims 41, 42, 45, 46, 50, 55-59, 62-68 and 72 are addressed below as if rejected.

As discussed in detail above, none of independent claims 37, 68 or 71 is anticipated by Takahashi et al. In the rejection under 35 U.S.C. §103, no additional support is provided in support of an allegation that any of claims 37, 68 or 71 is obvious in view of Takahashi et al. As Takahashi et al. do not disclose a liner layer comprising a polymer, none of claims 37, 68 or 71 is obvious in view of Takahashi et al.

It would not have been obvious to use a polymer, as alleged by the examiner. The examiner's rejections are based on the allegations that "it would be obvious to one [of] ordinary skill that metal oxides and organic polymers are art recognized equivalent for their use as an oxygen sensitive material..." and that "use of [silicone]…for a substrate would have been obvious to one of ordinary skill in the art due to the fact that a silicon substrate would have similar properties to a silicone substrate."

The examiner's attention is respectfully drawn to the specification at pages 16-17, paragraph [0049], wherein advantages of using a liner layer are described:

> "…Materials such as inorganic coatings or layers (e.g. a metal oxide coating) may have or develop amorphous zones or defects in the form of pinholes, cracks, or grain

> boundaries. When such defects are present in the surface of the barrier coating covering the polymer substrate, the permeating gases can escape through the defects at a higher rate than at other locations on the surface of the sample where there are no defects. Consequently, a portion of the sensing element that is adjacent to such defects will be reacted at a higher rate. The non-uniform degradation of the sensing element may leave sections of unreacted material within the sensing element, thereby resulting in an inaccurate reading. The liner layer usually behaves as a buffer region which sponges up (saturate with) the permeating gases before they are desorbed homogeneously. The homogeneous desorption of the permeating gases results in the uniform degradation of the sensing element, which in turn enables the decrease in electrical conductivity of the sensor to be more accurately correlated to the decrease in thickness of the sensing element."

The liner layer can comprise an organic polymer and/or inorganic polymer because it exhibits relatively little gas barrier properties (see page 17, paragraph [0051]). This feature is nowhere disclosed in Takahashi et al., nor would it be obvious to exchange an insulating film referred to by Takahashi with a film comprising an organic polymer and/or inorganic polymer because the sensor disclosed by Takahashi a) solves a completely different problem as explained in detail above and b) is not supposed to serve as buffer layer which ensures a uniform distribution of oxygen and/or water to the sensing element it contacts.

Takahashi does not describe the function of the Al_2O_3 or SiO_2 insulating film 9 located between the thin solid electrolyte film 3 and the thin SiO_2 insulating film 11. Elsewhere in Takahashi et al. an insulating layer is described for heating the sensor section (col. 5, lines 34-35). However in column 9, lines 35 to 36 of Takahashi only the function of the Si substrate 6 is described, namely to minimize power consumption.

Where the Al_2O_3 material is described in column 9, lines 45 to 57, such description refers to the material of the coating 2 illustrated in Figure 11 of Takahashi and not the insulating film 9. Such coating 2 is described elsewhere in Takahashi et al. as "to protect the structure…" (col. 5, lines 35-36).

Thus, Takahashi does not provide any teaching which would lead a person skilled in the art to use an organic polymer and/or inorganic polymer in the liner layer which has the characteristics of a polymer containing layer, as described in the specification of the present application as functioning as a "*buffer region which sponges up (saturate with) the permeating gases before they are desorbed homogeneously.*" (*supra*)

Additionally, with to the rejection of claims 63-67 it is noted that claims 63 and 66 have been cancelled and the subject matter incorporated into independent claim 37. Claims 64, 65, and 67 now depend

directly from claim 37. Claim 37 recites a "liner layer [that] comprises an organic polymer and/or an inorganic polymer…" In rejecting these claims, the examiner states only that "Takahashi et al. teach of the insulating (liner layer) comprising SiO_2." However, as detailed above, Takahashi et al. do not disclose a liner layer comprising a polymer and use of such would not have been obvious to one of skill in the art.

It is well established that if an independent claim is nonobvious under 35 U.S.C. §103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). (MPEP §2143.03) All of claims 41, 42, 45, 46, 50, 55-59, and 62-67 depend directly or indirectly from claim 37. Claim 72 depends from claim 71. Accordingly, none of claims 41, 42, 45, 46, 50, 55-59, 62-67 or 72 is obvious in view of Takahashi et al.

Based on the foregoing, Takahashi et al. fails to provide any logical basis for the sensor, method or system recited in claims 41, 42, 45, 46, 50, 55-59, 62-68 and 72. Takahashi et al. do not render the claimed invention obvious. Accordingly, withdrawal of the rejection of claims 41, 42, 45, 46, 50, 55-59, 62-68 and 72 under 35 U.S.C. § 103(a) as being obvious over Takahashi et al. is respectfully requested.

CONCLUSION

Based on the foregoing, all of Applicants' pending claims 37-62, 64, 65, 67-72 are patentably distinguished over the art, and in form and condition for allowance. The examiner is requested to favorably consider the foregoing, and to responsively issue a Notice of Allowance.

No fees are believed to be due for the filing of this paper. However, should any fees be required or an overpayment of fees made, please debit or credit our Deposit Account No. 08-3284, as necessary.

If any issues require further resolution, the examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss same.

Respectfully submitted,

/steven j. hultquist/
Steven J. Hultquist
Reg. No. 28,021
Attorney for Applicants

/kelly k. reynolds/
Kelly K. Reynolds

Reg. No. 51,154
Attorney for Applicants

INTELLECTUAL PROPERTY/
TECHNOLOGY LAW
Phone: (919) 419-9350
Fax: (919) 419-9354
Attorney File No.: 4276-109

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